--49. The method of claim 46, wherein the composition comprises a molecular complex with a molecule associated with the nanocrystal complexed to a second molecule that interacts with the biological moiety.--

--50. The method of claim 46, wherein the spectral emission is tunable to a desired wavelength by controlling the size of the nanocrystal.--

--51. The method of claim 46, wherein the interaction between the biological moiety and the composition comprises covalent interaction.--

--52. The method of claim 46, wherein the interaction between the biological moiety and the composition comprises noncovalent interaction.--

--53. The method of claim 52, wherein the noncovalent comprises hydrophobic interaction, hydrophilic interaction, electrostatic interaction, van der Waals interaction, or magnetic interaction.--

--54. The method of claim 46, wherein the biological moiety comprises a small molecule.--

--55. The method of claim 46, wherein the biological moiety comprises a protein, peptide or antibody.--

--56. The method of claim 46, wherein the biological moiety comprises a nucleic acid.--

--57. The method of claim 56, wherein the nucleic acid comprises DNA or RNA.--

--58. The method of claim 46, wherein the biological moiety comprises an amino acid.--

--59. The method of claim 46, wherein the biological moiety comprises a ligand.--

--60. The method of claim 46, wherein the biological moiety comprises an antigen.--

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--61. The method of claim 46, wherein the biological moiety comprises a cell.--

--62. The method of claim 46, wherein the biological moiety comprises a subcellular organelle.--

--63. The method of claim 46, wherein the semiconductor nanocrystal is water-soluble.--

--64. The method of claim 46, wherein the semiconductor nanocrystal comprises a core comprising a first semiconductor material, and a layer overcoating the core comprising a second semiconductor material.--

--65. The method of claim 46, wherein the spectral emission provides information about a biological state or event.--

--66. The method of claim 65, wherein the spectral emission provides information about the amount of biological moiety in the sample.--

--67. The method of claim 65, wherein the spectral emission provides information about the presence of the biological moiety in the sample.--

--68. The method of claim 67, wherein the biological state or event includes: biological interactions, biological processes, alterations of biological processes, alterations of biological moieties, structure of biological moieties, composition of biological moieties, conformation of biological moieties, or localization of biological moieties.--

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--69. A method of detecting biological moieties comprising:

providing a plurality of compositions capable of characteristic spectral emissions, the composition comprising a compound and a semiconductor nanocrystal associated with the compound, wherein each of the members of the plurality is characterized in that:

the nanocrystal of the member of the plurality has an emission spectrum distinct from the other members of the plurality, and

the composition of the member of the plurality has a corresponding biological moiety distinct from other biological moieties in the sample;

allowing a sample containing or suspected of containing one or more biological moieties to interact with the compositions; and

monitoring the spectral emission of each interaction between each composition and each biological moiety of the sample.--

--70. The method of claim 69, wherein the composition comprises a molecular complex with a molecule associated with the nanocrystal complexed to a second molecule that interacts with the biological moiety.--

--71. The method of claim 69, wherein each interaction between each composition and each biological moiety of the sample are monitored substantially simultaneously.--

--72. The method of claim 69, wherein the spectral emission provides information about a biological state or event.--

--73. The method of claim 72, wherein the spectral emission provides information about the amount of biological moiety in the sample.--

--74. The method of claim 72, wherein the spectral emission provides information about the presence of the biological moiety in the sample. --

--75. The method of claim 69, wherein the semiconductor nanocrystal is water-soluble.--

--76. The method of claim 69, wherein the semiconductor nanocrystal comprises a core comprising a semiconductor material, and a layer overcoating the core comprising a semiconductor material.--

--77. The method of claim 69, wherein the spectral emission is tunable to a desired wavelength by controlling the size of the nanocrystal.--

--78. A method of detecting an interaction between a composition and a biological moiety comprising:

combining a sample comprising a biological moiety with a composition, wherein the composition is capable of a spectral emission and comprises a compound and a semiconductor nanocrystal conjugated to the compound;

exciting the semiconductor nanocrystal; and

monitoring the spectral emission of the sample.--

--79. An apparatus for detecting interaction between a composition and a biological moiety comprising:

an excitation source for producing an excitation wavelength;

a sample holder arranged to receive the excitation wavelength and capable of containing a sample including a semiconductor nanocrystal associated with a biological moiety, the semiconductor nanocrystal capable of being excited by the excitation wavelength and producing an emission wavelength;

a detector arranged to detect the wavelength of emission; and

a filter between the sample holder and the detector to spectrally resolve the emission wavelength from the excitation wavelength.--

--80. The apparatus of claim 79, wherein the excitation source includes a UV or blue light source.--

--81. The apparatus of claim 79, wherein the excitation wavelength includes a wavelength shorter than the wavelength of emission.--

--82. The apparatus of claim 79, wherein the excitation source includes a white light source.--

--83. The apparatus of claim 79, wherein the excitation source includes a filter through which white light passes to produce the excitation wavelength.--

--84. The apparatus of claim 79, wherein the excitation source includes a laser comprising a continuous wave gas laser, a solid state diode laser, or a pulsed laser.--

--85. The apparatus of claim 79, wherein the filter includes an image subtracting double monochromator.--

--86. The apparatus of claim 79, wherein the filter includes two single monochromators with the second monochromator reversed from the first monochromator.--

--87. The apparatus of claim 79, wherein the filter includes a computer controlled color filter wheel.--

--88. The apparatus of claim 79, wherein filter includes a narrow band filter centered at the wavelength of emission.--

--90. The apparatus of claim 79, wherein the detector is a two-dimensional detector. --

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--91. The apparatus of claim 79, wherein the detector is a camera.--

--92. The apparatus of claim 79, wherein the detector includes a charge coupled device.--

--93. The apparatus of claim 79, wherein the detector scans the emission wavelength relative to a microscopic object.--

--94. The apparatus of claim 79, wherein the detector includes a diode array that records the emission wavelength at particular spatial positions.--

--95. An apparatus for detecting emission from a sample comprising:

an excitation source for producing an excitation wavelength;

a sample holder arranged to receive the excitation wavelength and capable of containing a sample including a semiconductor nanocrystal associated with a biological substrate, the semiconductor nanocrystal capable of being excited by the excitation wavelength and producing an emission wavelength;

a detector arranged to detect the wavelength of emission; and

a filter between the sample holder and the detector to spectrally resolve the emission wavelength from the excitation wavelength.--